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Revealing the archetype: The journey of a trecento Madonna and Child at the National Museum of Scotland

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ABSTRACT

The National Museums Scotland Madonna and Child project sought to uncover and document the history of a fine polychrome wood carving attributed to The Master of the Gualino St Catherine and to prepare it for display. A new body of knowledge has been assembled by the interdisciplinary team. The conservation treatment was informed by this work and led to further discoveries: the removal of overpaint exposing a previously hidden underdrawing. The ethics of the treatment decisions, including the removal of the Christ Child's 1960s' fingers

INTRODUCTION

The National Museums Scotland (NMS) *Madonna and Child* (Figure 1) first attracted art-historical attention when Giovanni Previtali identified the sculpture as a work by the anonymous artist he had championed and dubbed The Master of the Gualino St Catherine (Previtali 1984). The Edinburgh Madonna epitomised the technique and skill which first drew Previtali to him. Delicately carved and exhibiting traces of richly patterned polychromy, the sculpture is a fine example of 14th-century sculpture in wood from the central Italian regions of Umbria and Abruzzo.

NMS acquired the piece, which had been in Sir Michael Sadler's collection, from the dealer Sydney Burney in 1950. Interest in it was rekindled by its selection for display in the new Art & Design galleries at NMS and fanned by the arrival in Edinburgh of an art historian with detailed knowledge of the Master's oeuvre. These circumstances made it possible to obtain institutional support for a multidisciplinary project which won funding from the Association of Art Historians and the Henry Moore Foundation.

Figure 1. Front and back of the Madonna and Child

The project aim was to uncover and document the hitherto unexplored structure, polychromy and technique of the work, the first by the Master to be examined. While others conceal the maker's methods with their more 'perfect' but heavily overpainted surfaces, the exposed wood and islands of extant polychromy of the NMS Madonna invited its study.

required team dialogue and was opened up for the public to respond to in a series of blogs. The discovery of a rich polychromy including gold and glazed tin has led to further plans to produce a 3-D colour reconstruction. The collaborations developed during this project will facilitate future joint ventures for polychrome sculpture in Scottish collections.

Figure 2. En-face projected radiographic image showing original nails

This paper describes the findings, decisions and future plans for the sculpture, demonstrating the benefits gained from adopting a team approach. It explains how condition assessment and conservation treatment became integral to strategies for conveying the object's significance, and how technical analysis is a crucial counterbalance to art-historical hypothesis.

CONSTRUCTION

Computed tomography (CT) scanning and two-dimensional radiography (x-radiography) revealed that the majority of the sculpture is carved from one trunk with five affixed peripheral strips of wood. These are nailed into place and form parts of the Virgin's shoulders, arms and throne (Figures 2 and 3). Her right forearm is a separate nailed element. Christ's arm is also an addition: presumably a stronger joint was needed, and this is attached with a wooden tenon (Figure 4). Five further strips enclose the foot and another piece creates a fold in the Virgin's robe. The additions (bar the latter) were seemingly added where the girth of the tree was not great enough for the artist to develop the figure he desired. There are 45 nails in total, each with a flat angular-shaped head and long shaft. The wood was then prepared for polychromy with a layer of linen beneath the gesso. Nails of similar appearance were noted on the Gualino Master's *Madonna and Child* in the National Museum of Abruzzo, Italy.

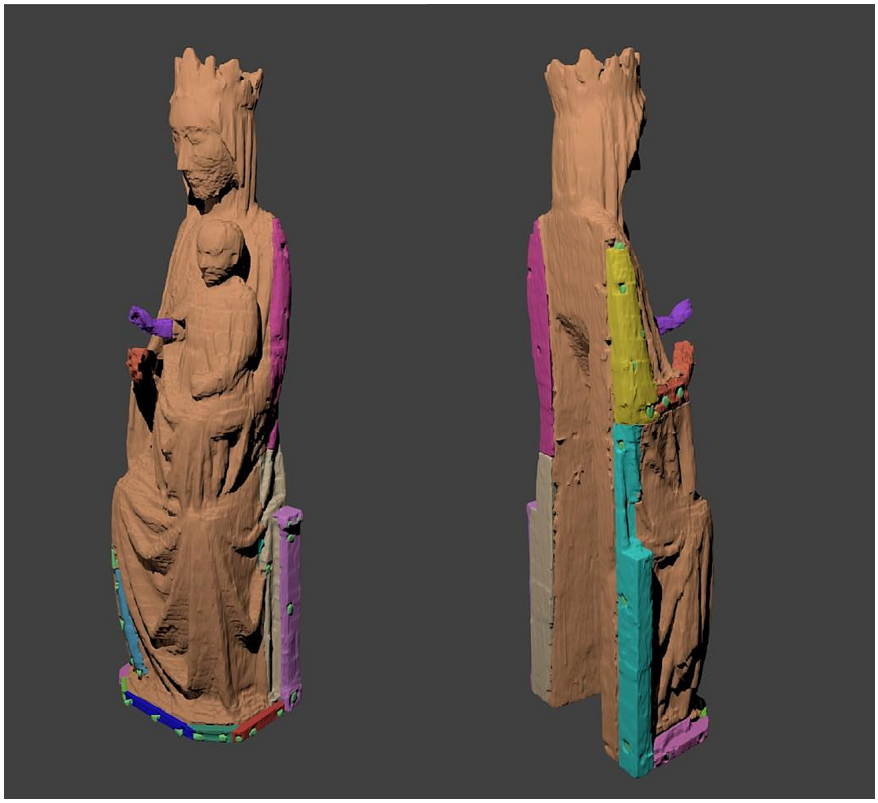

Figure 3. Rendered CT image showing additions (in colour) to the bole

Scanning electron microscopic (SEM/BSC) observation of a wood sample revealed that the main trunk species is poplar (*Populus* spp.) (Skinner 2016). The other timbers were not sampled, but CT images evidence a diffuse porous wood, perhaps also poplar (Mills 2016). Carbon dating results were 704 ± 28 BP (OxA-34377) cal AD 1260–1306 at 82.7% probability (Wileman 2016).

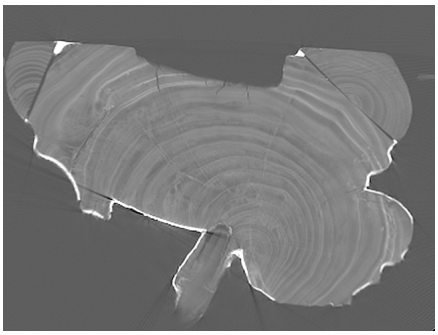

Figure 4. CT image showing a tenon joint at the front (image bottom) and two additional pieces sawn and nailed to the back (image top)

Figure 5. Side view of fine carving on the Virgin's face and mantle

The sculpture's back was left roughly hewn, with the exception of the Virgin's head and crown where details of form have been indicated (Figure 1). A portion of the back was removed with an adze. Though he did not remove the pith, it is assumed that the sculptor sought to reduce the risk of cracking (Kargère 2010, 45). There is nonetheless one significant radial crack. This runs through Christ's head and is filled with a piece of wood or other material of similar density.

The project art historian advanced the theory that the presence of core and heartwood in the heads and torsos of both Madonna and Child may have held special spiritual meaning for the Master, who, like other contemporary carvers, may have drawn comparisons between wood and the human body (Neilson 2014). However, it may also have been for practical reasons: restricting the majority of the carving to the bole reduced problems associated with attaching additional parts, such as differential drying, and the movement of joints (Kevin 2016). The core's positioning may also have been influenced by the sapwood's quality. Whatever is the case, the Master skilfully exploited the bole to minimise the need for additions. The Master's craftsmanship as a carver is also evident in the exposed wood, for example, the finesse of the Virgin's face, and in the quality of the mantle folds (Figure 5). Comparison with other sculptures in the *Gualino* group will be helpful in confirming the level of intent in his carving technique.

POLYCHROMY

In preparation for the taking of paint samples, measurements were made in situ by handheld x-ray fluorescence (pXRF) and several areas were selected for stratigraphic analysis using scanning electron microscopy with energy-dispersive x-ray (SEM/EDS) analysis.

SEM analysis of the samples revealed that the Madonna's original polychromy was characterised by the use of metallic foils (gold and silver) and the precious pigments cinnabar and minium (Table 1). Her robe, rendered using tin foil coated in a glaze coloured green by copper, once imitated brocade. As the *St Lucy* in the eponymous church in Rocca di Cambio (L'Aquila) and *St Catherine* in the Museo Nazionale dell'Aquila (Delpriori 2014) show, the use of green – or of a green glaze on tin – was not uncommon in 14th-century Central Italy. Analysis also revealed that her veil and crown were gold over an iron-rich red bole (Figure 6a). Christ's mantle was originally cinnabar glazed red, while his tunic was rendered with minium.

This range of materials corresponds well to that expected of wooden polychrome sculpture from Italy and France of this period (Levy 2010, Le-Hô and Pagès-Camagna 2014). For example, the use of green and red glazes has been observed in French sculptures of the 12th–15th centuries (Kargère and Rizzo 2010, Kargère 2014, Le-Hô and Pagès-Camagna 2014). Similarly, the insect red dye from *Kerria lacca* has been reported in other contemporary sculptures (Kargère 2014). Chromatographic analysis will reveal if it was used for the lake pigment in the red glaze.

In the majority of the samples investigated, the original paint layer was applied directly onto the gesso and made with pure pigments. Micro-chemical

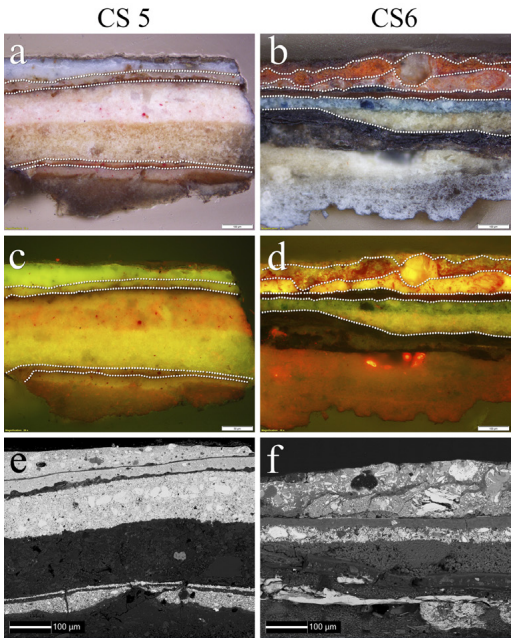

Figure 6. Paint cross sections CS 5 and CS 6 observed in natural light (a, b: scale bars are 100 µm); UV light after staining (c, d: scale bars are 50 µm and 100 µm); SEM/BSC (e, f: scale bars are 100 µm). The dotted lines indicate the different levels of polychromy

Figure 7. 1960s' overpaint highlighted under UV fluorescence

tests (Schäfer 2013) revealed the use of proteinaceous sizing, possibly animal glue (Cennini c. 1400) (Figure 6 c–d). In some places, an additional layer of lead white had been applied between the gesso and the paint: in the diamond decoration on the p. right of the throne, a layer of carbon black sits between a layer of lead white and tin foil.

The Virgin's robe had been overpainted several times: two successive layers of blue azurite (one applied atop a silver foil, possibly again a brocade) followed by several layers of orange using minium and lead white (Figure 6a, e). Similarly, areas of flesh had been repainted many times using lead white mixed with cinnabar or vermillion (Figure 6b, f). The grey-blue colouring of the Virgin's veil that can be seen today is based on a mixture of lead white, carbon black and a blue colourant (possibly indigo or woad).

OLD CONSERVATION TREATMENTS

Museum records showed that the object was conserved twice (Wylie 1967, Melville 1987). The 1980s' work was limited to cleaning and edge consolidation using Paraloid B-72, but neither the location nor extent of the work undertaken in the 1960s was documented fully. It was known that Christ's hand had been remodelled: 'Vinalak 5254' polyvinyl acetates had been used for stabilisation, 'Vinamul' with powder colour applied as a putty, and watercolours used for 'superficial colour'.

These repairs were mapped by inspection under ambient and ultraviolet light (UV) and confirmed by infrared microscopy (FTIR), pXRF and SEM/EDS analysis (Figure 7). A variant of the 1960s' filler AJK dough was found on many areas of the sculpture (Fulcher 2014). It had been used around paint edges and to build up areas to the level of the extant polychromy before retouching. These areas had been overpainted on the chest and on head and neck (where titanium was identified) and included painting in 90% of the Virgin's right and 70% of her left eye. Colour washes of red and blue (in which barium was identified), had been applied to the clothing: over exposed gesso and directly onto bare wood.

Another significant and undocumented repair phase was mapped: a thick plaster layer with a wood-coloured coating. Its colour suggests that it dates to a time when the majority of the polychromy was already lost and is assumed to have taken place between the object's removal from a devotional setting and its museum acquisition. Records linking these repairs to either Sadler or Burney have not come to light and their attitude towards conservation is not known. Both men are recognised, however, to have championed sculptural form, as exemplified particularly by wooden figures foregoing surface colour. With further research it may be possible to pinpoint the timing of this treatment.

CONDITION AND TREATMENT DECISIONS

Though the remaining polychromy had been extensively contoured with consolidant, test removal indicated that the object was stable without it. The islands of colour were well bound to the wood with no indication of significant friability. The object is known to have been displayed

Figure 8. Madonna and Child after conservation

ex-case, and the exposed edges may have been protected to minimise visitor damage. Now to be displayed behind glass, only superficial cleaning was required.

Treatment aims were twofold: the preservation of the sculpture as an 'aesthetic entity' and the provision of a window onto the past (de Roemer 2014, 12). It was unanimously decided that the museum interventions should be removed, including the 'blessing' gesture which bore no resemblance to any of the known poses of the Master's Christ Childs. The 1960s' treatment seems to have been motivated by a desire to bring a greater unity of colour to the piece, and to return life to the facial features. New knowledge suggested that this was making the complex surface harder to understand. Solvent tests showed that these interventions could be removed using acetone without affecting the underlying paint layers.

Their removal had significant implications for Christ and Virgin. He would be without fingers; she potentially eyeless. Did removal risk reducing the overall aesthetic impact? Answering this question went beyond the realms of preservation; thus, team meetings became crucial, and decisions now also took in the vision for display, curatorial understanding of the work's recent historical context and art-historical assessment of the piece within the canon of trecento sculpture.

TREATMENT REVELATIONS

The results of the team's decisions were positive and revealing. Christ's palm was found to be intact with polychromy present. Taking away overpaint exposed gesso, linen and fine tool marks on the bare wood. It also revealed a hitherto unappreciated aspect: black underdrawing on the Madonna's face which ran beneath the layers of original polychromy (Figure 8). Further analysis is required to confirm whether or not these sketched guidelines are original, but examples of such underdrawing on the 14th-century *Notre-Dame de Bonnes-Nouvelles* warrant this speculation (Faunières 2014, 95). Underdrawing now provides a crucial criterion for comparison with the other sculptures purportedly by the Master.

DISSEMINATION

The team undertook to disseminate their findings among as wide an audience as possible, and, in ranking this action as highly as research and conservation activities, adopted a new and holistic approach. Given the largely un-researched, un-analysed and un-conserved body of works linked to the Master of the *Gualino St Catherine* and the unique opportunity to examine one work in minute detail, it was felt that these findings must be shared. This paper is part of the commitment to address specialist audiences, but the team's work has also been opened to all. Conversations have been shared with the public, inviting them to engage with the team's work through a series of blogs receiving 27,072 reaches on Facebook (King 2015, Palozzi 2016, de Bellaigue 2016). The team emphasised collaboration and encouraged external participation. The project curator and conservator contributed to the museum's public programme with free talks, and the project art historian presented to the Curatorial Forum.

Conservation completed, the Madonna and Child is now on display in a new gallery where she can be admired by some of the museum's two million yearly visitors. The team's work is not yet at an end and we intend to produce a 3-D digital model recreating the original polychromy and subsequent repaints. This tried-and-tested approach, recently used on another 14th-century Madonna and Child (Stein 2013), seems particularly suited to ours where the surface condition renders interpretation complicated. We see exciting visitor engagement opportunities in both the generation of this data and the final product.

Table 1. Summary of paint analysis: all cross sections were observed in natural light, UV light and analysed by SEM/EDS. Samples indicated † were subjected to fluorescent staining

Entry	Description	Ground	1st Level	2nd Level	3rd Level	4th Level	5th Level	6th Level
CS 1	Grey, diamond pattern, p. right of throne	Gesso	1 - Lead white 2 - Black layer (carbon black?) 3 - Tin foil	--	--	--	--	--
CS 2	Red, diamond pattern, p. right of throne	Gesso	Cinnabar	--	--	--	--	--
CS 3†	Pink-red, p. right of throne	Gesso	Lead white	1 - Gesso 2 - Red lake (possibly madder) mixed with lead white	--	--	--	--
CS 4†	Blue, Virgin's veil	Gesso with proteinaceous size	1 - Red bole 2 - Gold foil	Thin glaze (?) rich in size and mixed with green earth	Grey: lead white, carbon black and possibly indigo	--	--	--
CS 5†	Flesh, Virgin's hand	Gesso with proteinaceous size	Lead white and cinnabar	1 - Thin organic layer 2 - Lead white and cinnabar	1 - Gesso 2 - Lead white and cinnabar in proteinaceous medium	1 - Thin organic layer 2 - Lead white and cinnabar	1 - Thin organic layer 2- Lead white	--
CS 6†	Red, Virgin's robe	Gesso with proteinaceous size	Brocade: 1 - Tin foil on proteinaceous size 2 - Green glaze (Cu)	1 - Gesso 2 - Lead white and azurite	Brocade: 1 - Red bole with proteinaceous size 2 - Silver foil 3 - Residual layer of azurite	Lead white and minium	1 - Thin layer of ochre 2 - Lead white and minium in proteinaceous medium	Possible red lake on aluminium
CS 7	Flesh, Virgin's neck	Gesso	Lead white and cinnabar	--	--	--	--	--
CS 8	Red, Virgin's crown	Gesso with inclusions of celestine (SrS)	1 - Red bole 2 - Gold foil	Orpiment	Yellow ochre	--	--	--
CS 10	Orange, Christ's tunic	Gesso	Minium	Dark layer: not identified (residual Ca, Pb, Cl, Na, As, K, Fe)	--	--	--	--
CS 11	Red, Christ's mantle	Gesso	Cinnabar	Possible dark/ green layer (carbon, residual Fe/Cu)	--	--	--	--
CS 12	Red overpainted yellow Christ's mantle (knee area)	Gesso	1 - Cinnabar 2 - Red glaze	1 - Gesso 2 - Red ochre	1 - Gesso 2 - Red ochre	Orpiment	Yellow ochre	

CONCLUSION

The conservation and analytical work undertaken at NMS allows scholars, conservators and visitors to delve into the sculpture's pre-museum history. It goes hand in hand with curatorial research into the piece, both art-historical and in respect of its function as a collectable. Together they provide insights into *why* the Madonna was as she was, and *what* led to her becoming as she is. The collaboration this paper documents has played an important part in arguing for and achieving her present appearance.

The Madonna and Child project has also enhanced knowledge of Previtali's Master of *Gualino St Catherine* and drawn attention to the quality of the carving and the richness of the polychromy of a long-neglected object. We hope that our findings can and will be used to test the integrity of Previtali's grouping and are eager for others to engage with and test our thoughts. This study is intended to provide both a keystone for future discussions of the artist and his works, and a case study for collaborative action. The approach taken has generated a wide network of new relationships. Going forward, the museum has committed to seek out projects which unite colleagues across the departmental disciplines, and which support the creation of a museum community encouraging all round accountability: to collections, colleagues and museum users.

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MATERIALS LIST

Technovit 2000 LC, 1-component methacrylate
Heraeus Kulzer Technique
Wehrheim, Germany
kulzer-technik.de/en_kt/kt/maerkte/metallographie/produktbereiche/verbrauchsmaterialien_einbetten_1/technovit_2000lc.aspx

SYPRO Ruby Protein Blot Stain
Thermo Fisher Scientific
Paisley, UK
www.thermofisher.com/order/catalog/product/S11791

INSTRUMENTATION

Computed tomography (CT) and two-dimensional radiography were undertaken at the Royal (Dick) School of Veterinary Studies in Edinburgh. Volume rendering was undertaken using Drishti 2.6.2 open source software. C-14 dating of the wood was performed at the Oxford Radiocarbon Dating Accelerator Unit.

In-situ measurements of the pigments and restored areas were undertaken using a handheld Thermo Scientific Niton XL3t analyser with a GOLDD detector (pXRF).

Paint samples for the cross sections were prepared in Technovit 2000 LC (Heraeus Kulzer, Germany), a 1-component methacrylate that polymerizes under visible blue light. These were dry polished with Micro-Mesh® sheets using grades 1800 to 12000 and examined under visible (incident light, dark field and incident light, bright field) and ultraviolet (UV) light using an Olympus BX41 microscope and an Olympus Stream Start 1.8 image analysis software. Fluorescent staining for proteins was undertaken with SYPRO® Ruby Protein Blot Stain.

Paint cross sections and the wood sample were observed using a CamScan MX 2500 scanning electron microscope (SEM) working in backscattered mode (BSC) and analysed by energy dispersive x-ray analysis (EDS) using an X-Max^N 80 mm^2 detector working with Aztec™ software.

Additional organic residues or consolidant were characterised using a Thermo Fisher Nicolet iN^{10} infrared microscope (FTIR) with liquid-nitrogen-cooled MCT detector working in transmission mode and OMNIC™ Picta™ interface.

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